

Stroke Mimics and Chameleons: Quandaries in the Field

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What's the difference

- Stroke **mimic**: *Looks like a stroke, is something else*
- Stroke **chameleon**: *Looks like something else, is really a stroke!*



Scope of the Mimic

- Recent eval by Briard, et al:
 - 960 patients transported by EMS during an 18 month period
 - 42% mimics
 - 55% other neurologic diagnoses
 - 20% seizures, 19% migraines, 11% peripheral neuropathies
 - 45% non-neurologic diagnoses
 - Cardiac 16%, psychiatric 12%, infectious 9%
 - Neurologic mimics were younger (~64 years) than non-neurologic mimics (~70 years)



Entering a new era

- Large vessel occlusions
- Now a 24 hour time window for mechanical thrombectomy
 - Most centers will likely activate the > 6 hour patients from within the ED, still working out those details
- Volume of stroke mimics/chameleons in the new time window?
- Effects on resource management?
 - At the hospital level?
 - At the regional level with distance transports?
- ***Need Emergency Responder Impressions now more than ever in order to learn for the future!!***

General Principles



Positive symptoms

- Indicate an excess of central nervous system neuron electrical discharges
- Visual: flashing lights, zig zag shapes, lines, shapes, objects
- sensory: paresthesia, pain
- motor: jerking limb movements
- Migraine, Seizure are characterized with having “positive” symptoms

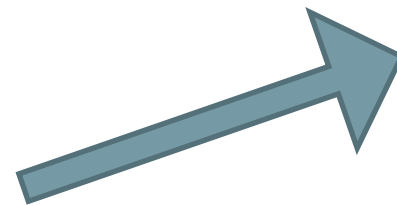


Negative symptoms

- Indicate a loss or reduction of central nervous system neuron function – loss of vision, hearing, sensation, limb power.
- TIA/Stroke present with “negative” symptoms.

° **FIRST, THE MIMICS**

Not really
Batman....





Predictors of Stroke Mimics

Increased odds of Stroke

- Abnormal eye movements
- Higher SBP
- Increased DBP >90mmhg
- History of AF or angina

Increased odds of Mimic

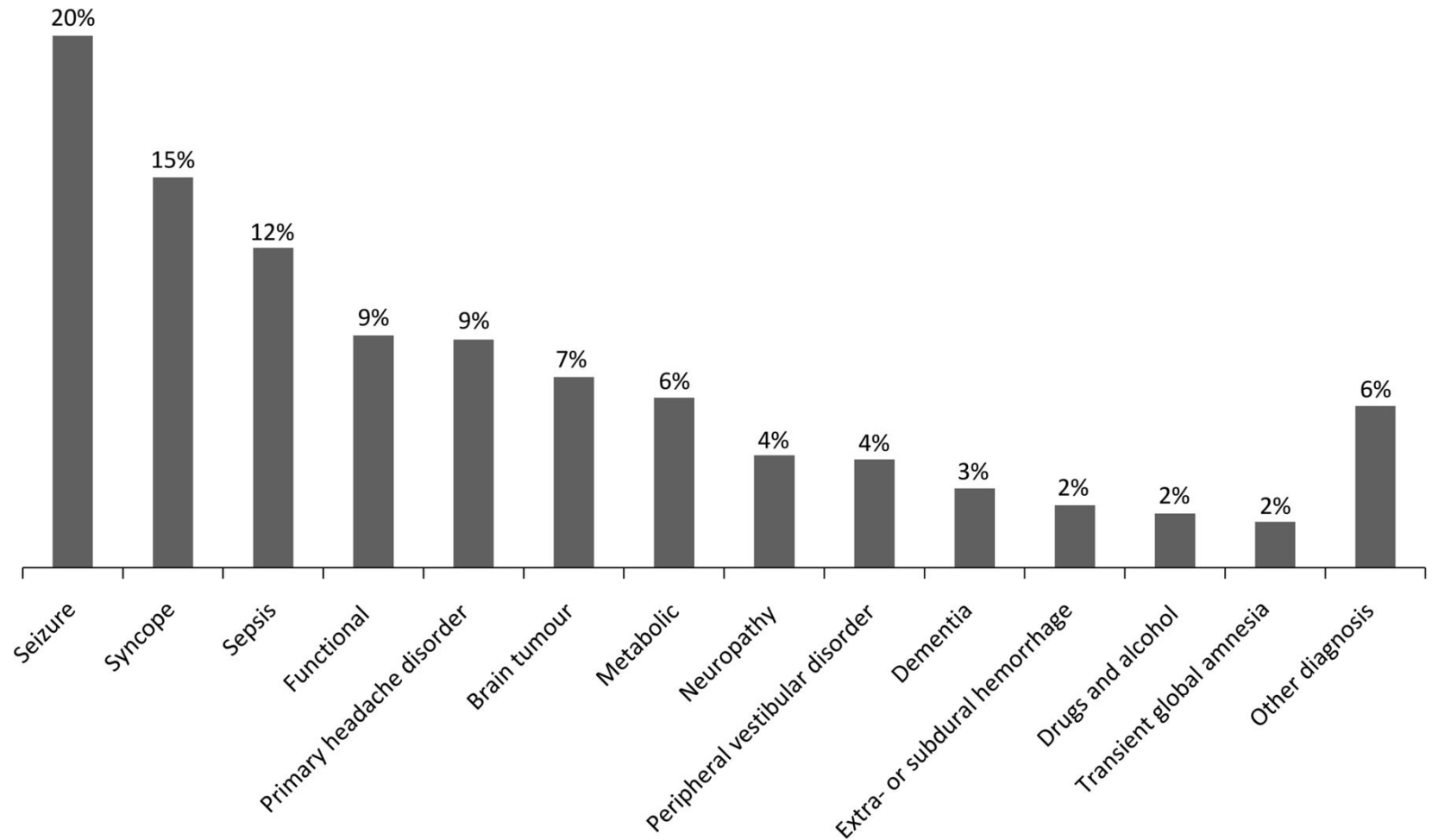
- Decreased LOC
- Normal eye movements
- Cognitive dysfunction
- Female
- Younger age



Common Mimics

- **Neurologic**
 - Seizure w/Todd's paralysis
 - Complicated migraine
 - Bell's Palsy
 - Brain tumor
 - Demyelinating disorder
- **Cardiac**
 - Syncope
 - PRES
- **Psychiatric**
 - Conversion disorder
- **Inner Ear**
 - BPPV
 - Labyrinthitis
- **Metabolic**
 - Hypoglycemia
 - Sepsis
 - Hyponatremia
 - Hepatic encephalopathy
 - Intoxication

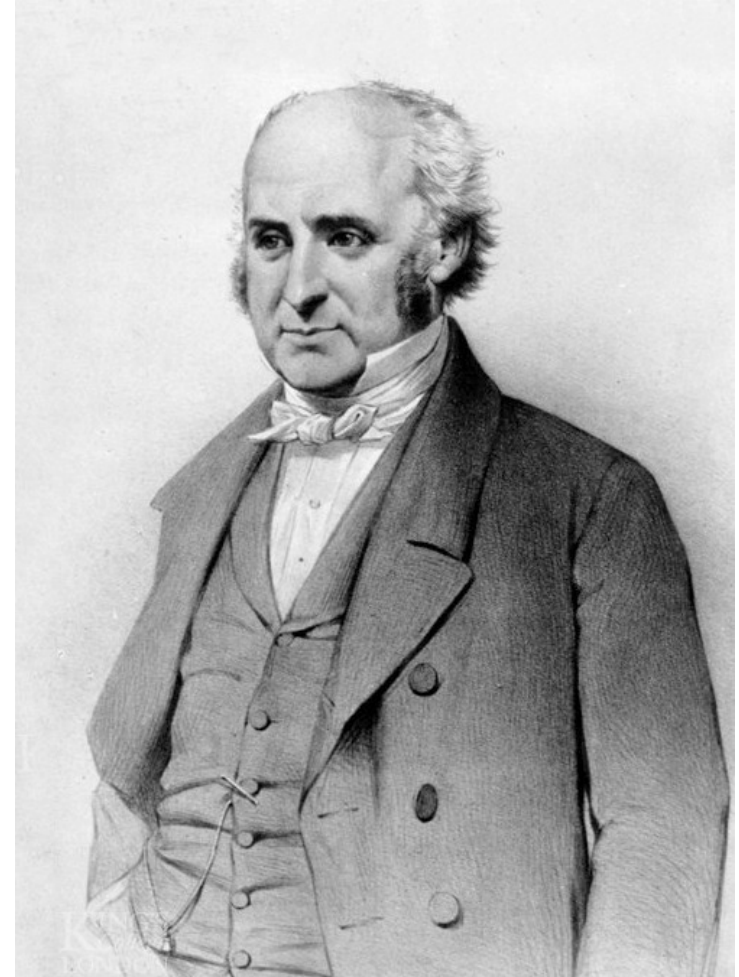
The 20 most common stroke mimics, identified in a systematic review and meta-analysis of case series.



Peter M Fernandes et al. *Pract Neurol* 2013;13:21-28

Todd's Paralysis

- **Post-seizure paralysis**
 - Can be brief or prolonged
 - +/- confusion, sensory loss, visual changes
 - Can happen with any seizure, even alcoholic withdrawal seizures
- Unless you directly witness seizures, still **call it in** as a potential stroke
 - Pts with epilepsy have strokes, too
- Collect information about **antiepileptic medications**
- Sometimes, only the CTA and/or MRI can tell the difference
- Include both Stroke and Todd's Paralysis on the **impression** on your run sheet





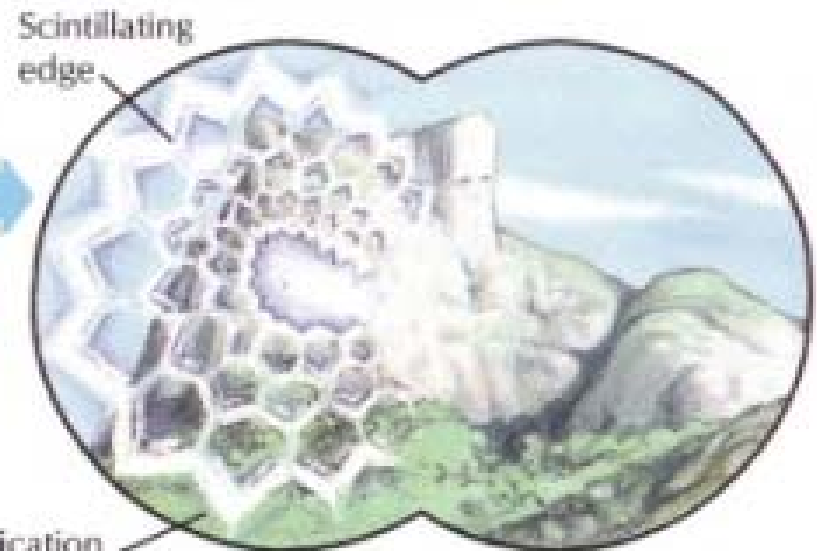
Complex Migraine

- Headache may present before, during, or after neurologic symptoms manifest
- Some complex migraines never have an associated headache (the “acephalgic” variant)
- Can develop aphasia, visual loss, hemiplegia, confusion, etc.
- The presence of positive neurologic features, most typically **visual scotoma**, help make this diagnosis

Scintillating Scotoma and Fortification Phenomena



Early phase: isolated paracentral scintillating scotoma



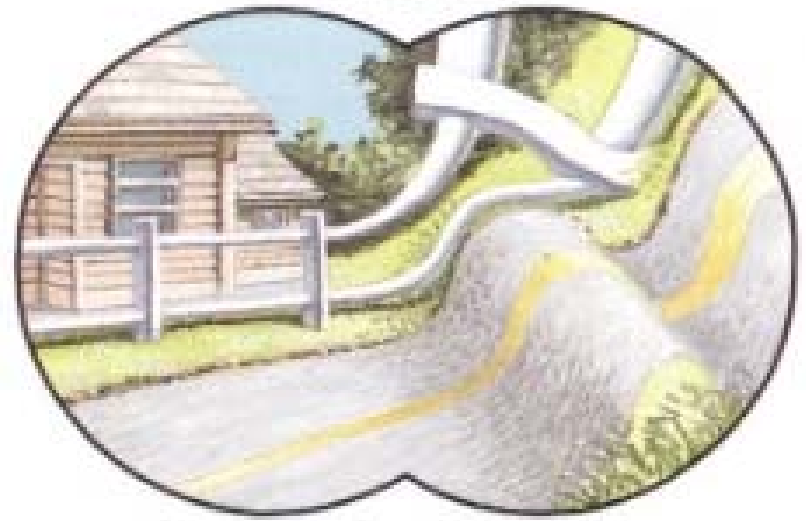
Spread of scotoma to involve entire unilateral visual field

Wavy lines (heat shimmers)



Wavy line distortions in part of visual field similar to shimmers above hot pavement

Metamorphopsia



Distortions of form, size, or position of objects or environment in part of visual field



Hypoglycemia

- Global metabolic abnormality that can present with **asymmetric neurologic findings**
- Key reason all potential stroke patients have a mandatory glucose checked in pre-hospital setting
- Hypoglycemia can exclude from IV tPA treatment as a profound stroke mimic with risks of **severe and permanent brain damage** if not treated rapidly

Hypoglycemia

- Neurologic abnormalities usually resolve rapidly
 - Rare cases resolve over hours
- Insulin overdose, alcohol intoxication, sulfa medication use/overuse
 - Rarer causes: insulinomas, Addisonian crisis





Hypoglycemia

- Glucometer Error
 - Can give a false elevation and mask hypoglycemia in the setting of **anemia**, **hypoxia**, **high pH**
 - Patients with **peritoneal dialysis** may have high concentrations of maltose, which interacts with Accu-chek strips and can mask hypoglycemia
- Operator Error
 - Even slight contamination on the skin can cause significant fluctuation in values



Brain tumors

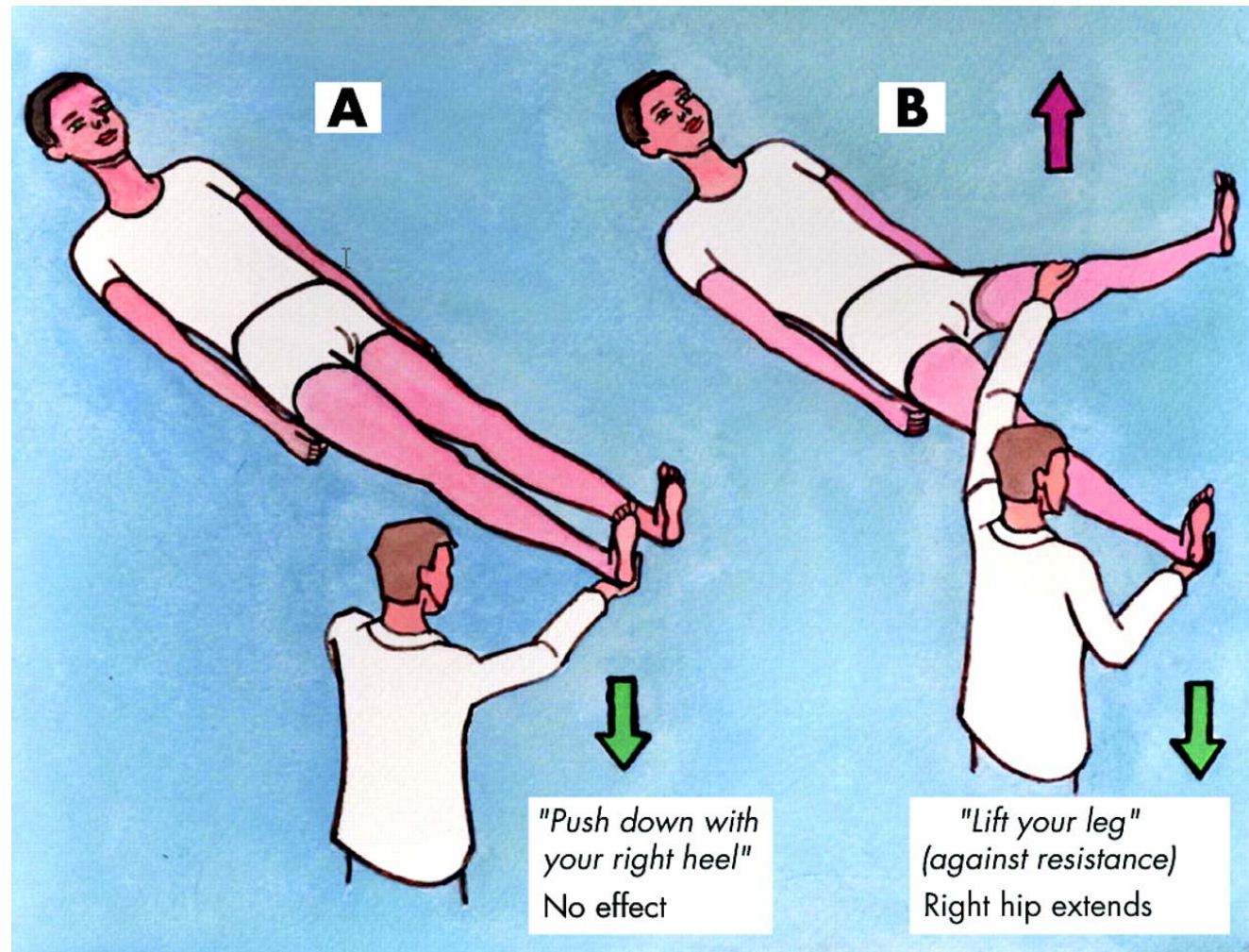
- Tumors usually cause sloooooowly progressive deficits
- 5% of tumors have an acute, stroke-like presentation
 - Usually from hemorrhage into the lesion
 - Sometimes from true ischemia when either the edema or the mass obstructs a blood vessel
 - Or when there is a seizure with a Todd's paralysis



Conversion disorder/functional

- Different from malingering, **not deliberate**
- No benefit to confrontation
- **Call it in** if pt is in the time window and FAST positive, but share your impressions with the accepting physician
- **Inconsistencies** in history and in physical exam
 - Hoover maneuver
 - Drift without pronation
 - Severe weakness without reflex asymmetry

Hoover maneuver



Drift without pronation

- Specificity 100%, sensitivity 96% for functional weakness
- The arm drifts down but no pronation
- Counts as pronation if even the 4th and 5th fingers rotate slightly



Sepsis/Infection

- Most common is UTI/urosepsis
- Usually presents with confusion, often misinterpreted as dysarthria or aphasia
- Often accompanied by agitation or somnolence
- May not have complained of urinary symptoms

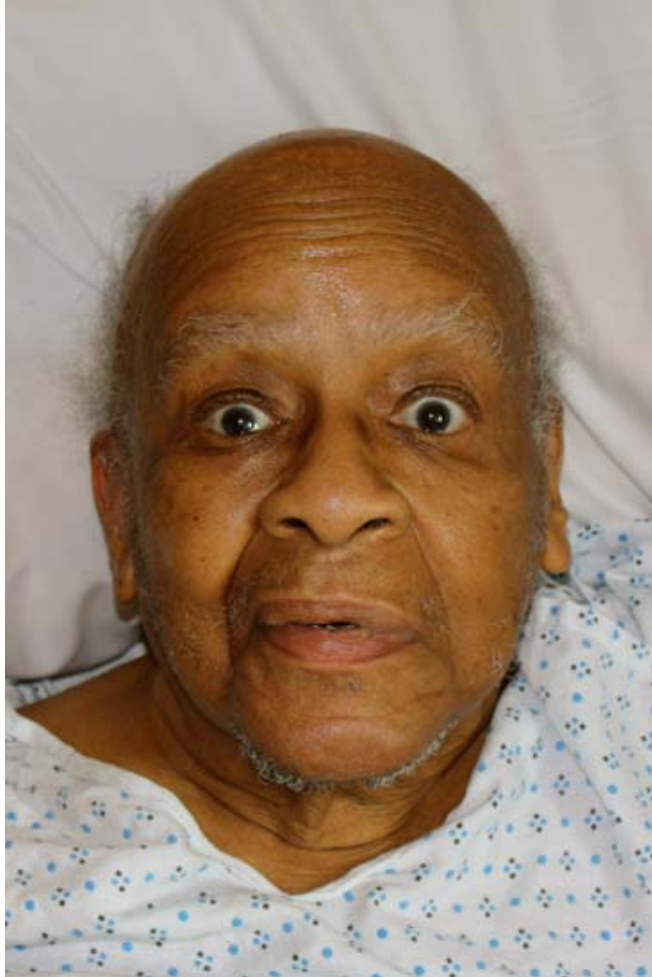




Bell's Palsy

- Most common cause of unilateral facial paralysis
- Bell's comes on over hours to days, tends to affect a younger population
 - Can have increased auditory sensitivity
 - Increased lacrimation
 - Very rarely has sensory change
 - Affects upper and lower face
 - Hard to completely close eyelids, eyes dry out

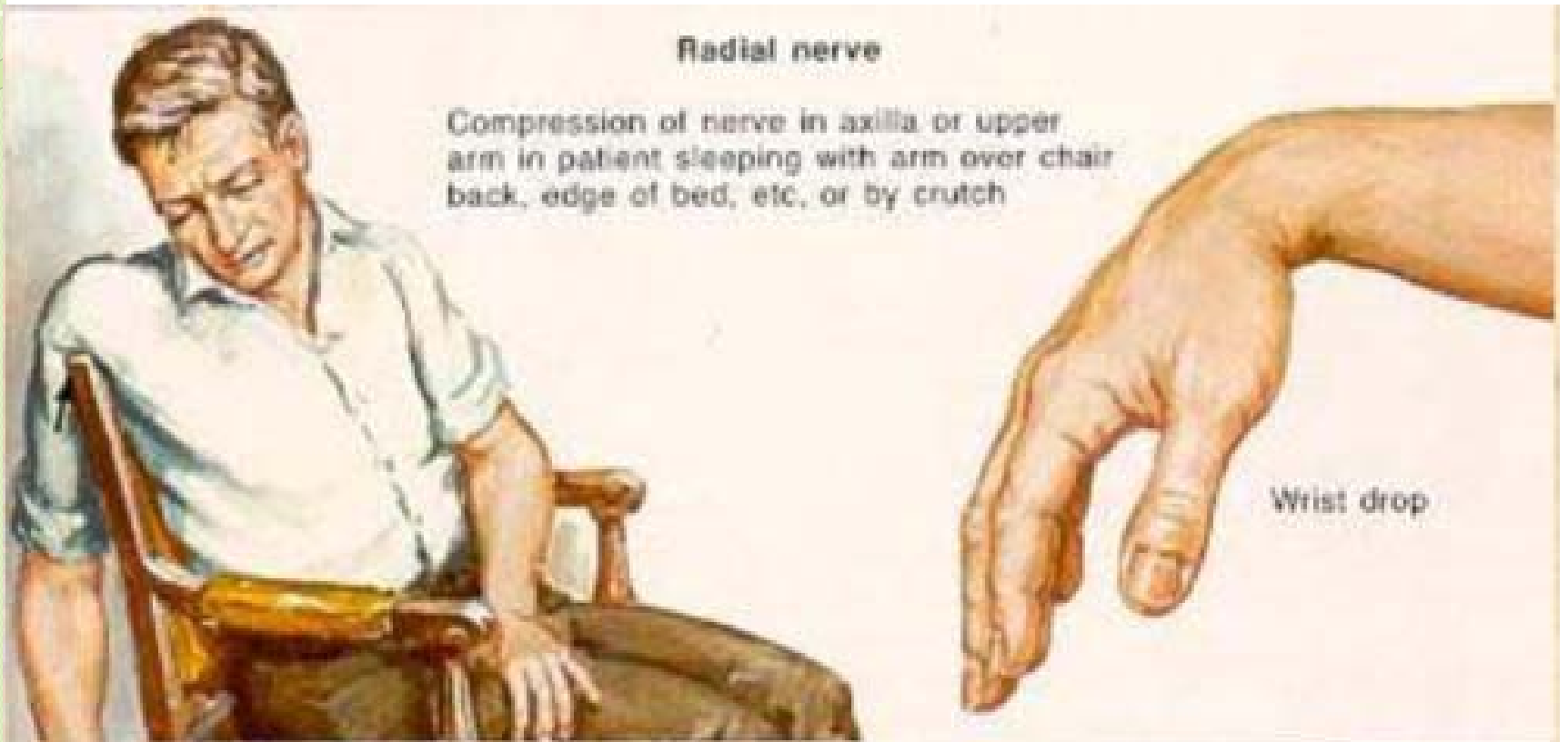
Stroke versus Bell's Palsy



Not always easy to tell....

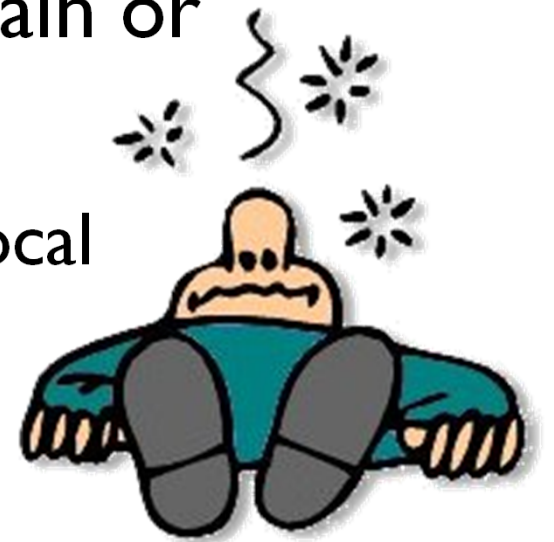


Saturday night palsy



Syncope

- Abrupt and transient LOC
- Absence of postural tone
- Rapid and usually complete recovery
- Usually caused by a global interruption of blood flow to the entire brain or the brainstem
 - diffuse process rather than focal



Syncope

- More commonly cardiac than neurologic
- If neurologic, more commonly seizure than stroke
 - Look for prolonged confusion as a hallmark of seizure
- **Common Types of Syncope**
 - Vasovagal (neurocardiogenic)
 - Cardiac ischemia/arrhythmia
 - Situational
 - (after coughing, urination, defecation, etc)
 - Orthostatic



° **NOW...ON TO THE
CHAMELEONS**



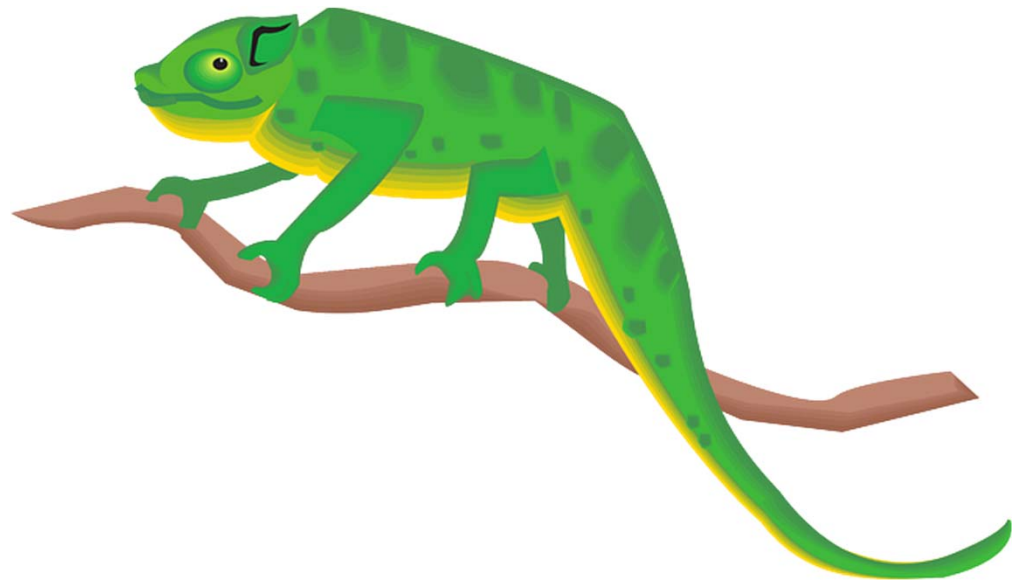


Chameleons are easy to miss

- By their very nature, they are **not obvious** strokes
- Will usually be **FAST negative**
- History of **acute onset** is helpful
- Understanding how to test for true “aphasia” is helpful
- Many mimics can be “flipped” into chameleons!

Most common chameleons

- AMS/isolated confusion (~30%)
- Syncope (~15%)
- Hypertensive emergency (~13%)
- Systemic infection (~11%)
- Other





Atypical Stroke Presentations

- Movement disorders
- Isolated confusion
- Sensory abnormalities
- Acute amnesia
- Shaking TIAs



Movement Disorders

- **Acute Hemiballismus:** Infarct in the midbrain/subthalamic nucleus
- **Dyskinesias:** hyperkinetic/hypokinetic, can be found with strokes in the motor cortex or subcortex (rare!)

Isolated confusion



- Can look like acute intoxication, unwitnessed seizure, acute psychosis if agitated.
- Isolated **parietal lobe strokes** can cause confusion (sometimes agitated) without motor deficits
- **Aphasia** can be mistaken for confusion
 - NOT all speech trouble is actually aphasia
 - Save this term for someone who actually has word substitution, or gets part of the word incorrect (like a syllable is out of place), or who has trouble getting all the words out
 - Slurred speech is dysarthria, not aphasia

Isolated parasthesias

- Tingling in the arm, face, or one side of the body
 - May be painful
- Often interpreted as trigeminal neuralgia or functional, or multiple sclerosis
- Can actually be from a stroke in the sensory (parietal) cortex or in the thalamus
- Key is sudden onset and patient with stroke risk factors



Infection-associated strokes

- Sepsis increases hypercoagulability and cause a secondary stroke
 - Look for **asymmetric findings** in an infected patient
 - Look for actual aphasia in a “confused” patient with fever
 - Look for acute onset
- Meningitis can also cause a secondary stroke



Migrainous infarcts

- Extremely rare
- Aura can become permanent
- Most common in migraine patients who routinely experience ocular migraines with visual field loss instead of scotoma
- Patients with **familial hemiplegic migraine** or **basilar migraine** subtypes are at higher risk for migraine-associated strokes





Limb shaking TIAs

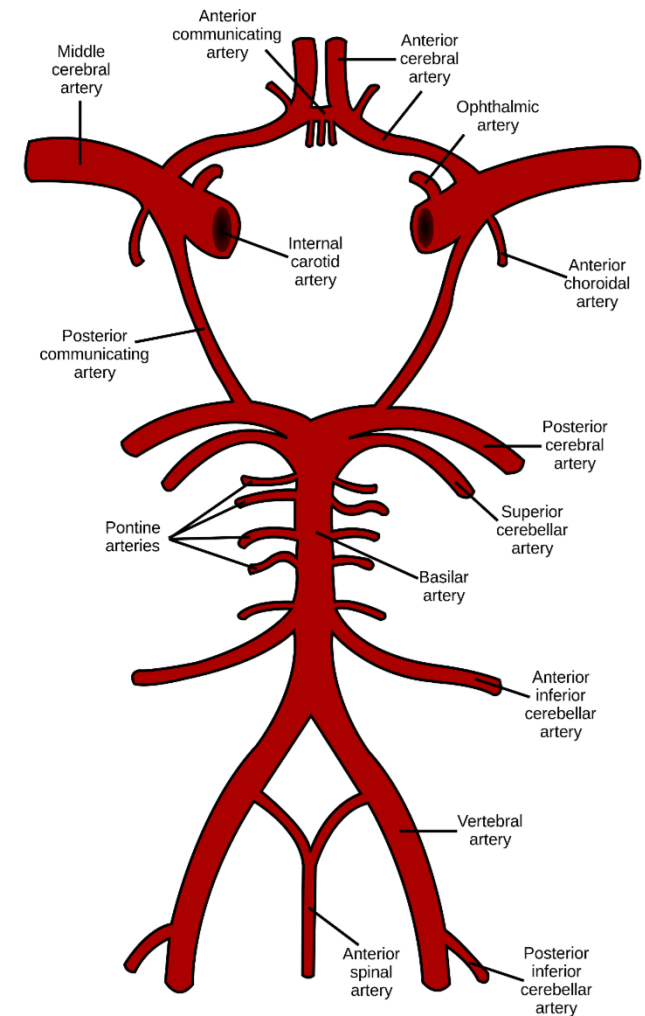
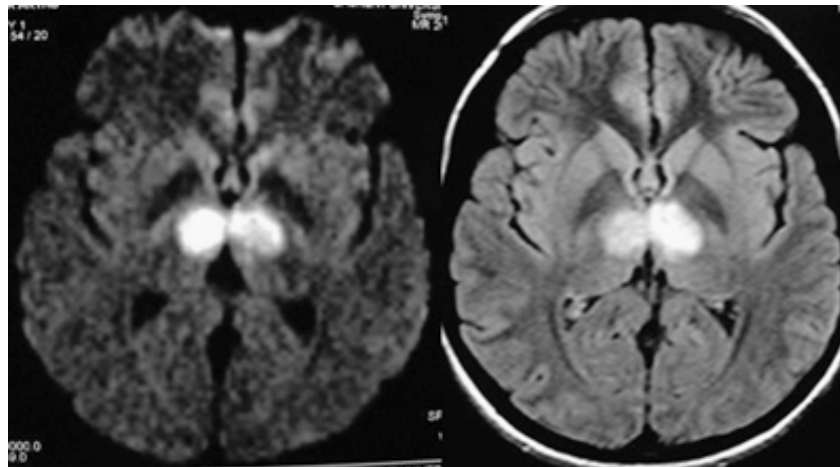
- **Critical carotid stenosis** (occasionally other vessels)
- Leads to tenuous perfusion of motor cortex or other portion of corticospinal pathway in the brain
- Usually an orthostatic component
 - “I shake when I stand up!”
- Mistaken for new-onset seizures or Parkinson’s disease

Limb shaking TIAs



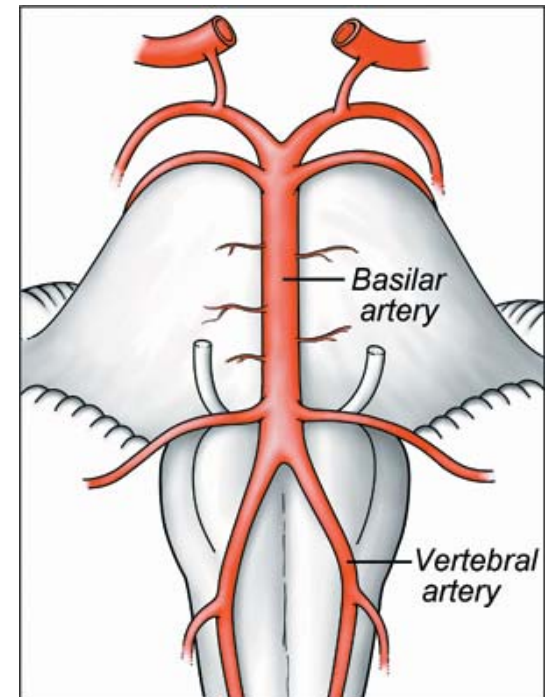
Bi-thalamic strokes

- Can look like severe obtundation or acute onset **amnesia**
- Can mimic **intoxication**
- Seen in young patients with cardiac disease



Syncope

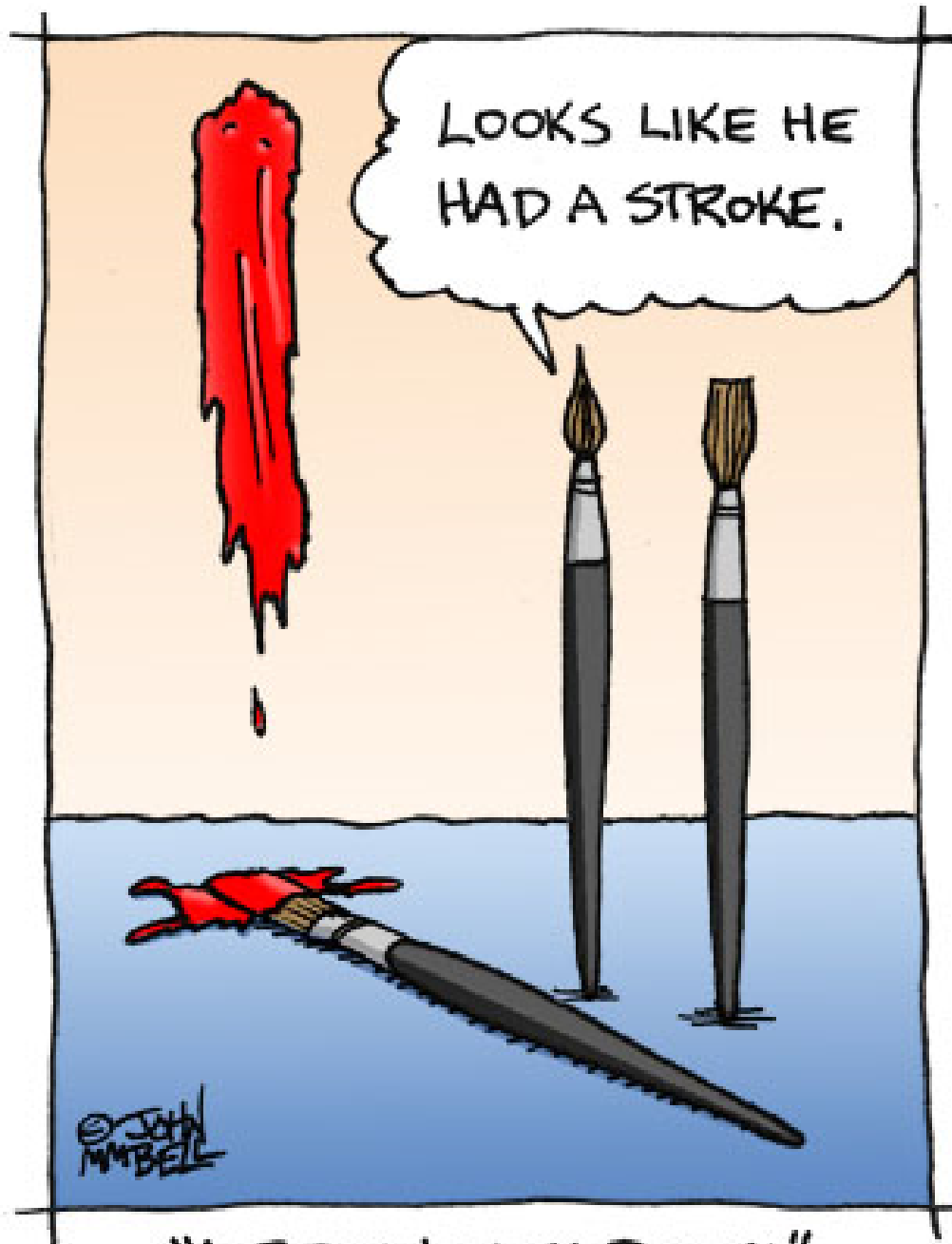
- Usually not a stroke, but the exceptions are:
 - Transient occlusions of the basilar artery
 - Vertebrobasilar insufficiency (*variation of above*)
 - Bi-thalamic infarctions
- Sometimes the stroke is incidental, had the syncope from an arrhythmia that **ALSO** caused the stroke



Syncope

- Key to neurologic syncope is to listen for additional symptoms:
 - Double vision, complete visual loss prior to syncope
 - Nausea, vomiting
 - Room-spinning vertigo (not just “dizziness”)
 - Rarely, triggered by neck positioning
 - (rotation, flexion, etc)





LOOKS LIKE HE HAD A STROKE.

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"A BRUSH WITH DEATH"